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GOOD ROADS MOVEMENT IN THE SOUTH

By JOSEPH HYDE PRATT,

State Geologist of North Carolina and President Southern Appalachian Good Roads Association, Chapel Hill, N. C.

The question of the improvement of the public road has become one of the more important ones of the day, and the cry is now going up from nearly all the states of the South to the state legislatures and even to Congress for better public roads. Our statesmen have for several years been attracted by the question of transportation, but of the three important methods of transportation, railways, water-ways, and roads, the two former have been receiving most of the consideration of these men, and yet the public roads are just as, or even more, important, for the reason that at least ninety per cent of the freight must first be hauled over them.

The people are beginning to realize the great importance of good roads and the enormous saving that such roads will bring to them; they are beginning to demand good roads; and are forcing our public men to take a deeper and wider interest in this most vital question. In most of the states throughout the South the good roads movement has been agitated to such an extent that it is not now a question of, "Do we want good roads?" but, "How can we get good roads?" There are many reasons why this awakening of the people of the South to the great need of good roads, and the great benefit they give to a community, has been late in coming. Yet, now that we are aroused we will attack this problem with the same vigor and determination that we have others, and I am confident that we will solve it in such a way that it will react for great good in the industrial advancement of the South.

When railroading was first begun in this country many people had the idea that there would be little use for the public road in those sections of the country that were traversed by the railroad. Time has demonstrated, however, that railways are simply the main arteries of travel, and public roads are the veins, each being a necessary part of the other in our system of transportation, and that without good public roads, railroads fail in accomplishing

what is required and demanded of them. Improvements in railway transportation facilities have reached a high state of efficiency, while the public highways have in many states been greatly neglected.

From the commercial standpoint the public road question concerns the farmer more than any other class of people, as practically all agricultural products have to be hauled for a greater or less distance over the public road. There is, at present, but little chance of reducing the railway transportation charge on agricultural products, but there is a splendid opportunity in nearly every county of every state in the South to reduce the cost of public road transportation charge on these products. Over many of the public roads of the South it is now impossible for a farmer to haul more than half a ton. It may be that a considerable portion of the road between him and town may be a fairly good road over which he could easily haul a ton or more; but there are too many bad places and heavy grades on the roads where it is impossible for his team to haul over half a ton. Consequently, it is necessary for him to load his wagon for these rough, heavy places and not for the good places.

If the farmer is not over eight miles from the railroad, his team can make a round trip in a day if the roads are not too muddy and there are not too heavy grades. If his team is worth \$2.50 per day, it has cost him at the rate of $62\frac{1}{2}$ cents per ton for each mile. On the railroad it can be shipped to almost any point that the farmer desires for one-fiftieth to one-hundredth of the rate which it has cost him to bring it to the railroad. This is because the science of transportation has been highly developed in connection with railroading and almost entirely undeveloped in connection with the public road. As public road improvement goes on the farmer will find that he can begin to haul from two to four times as much per load as formerly, and in one-quarter to one-half the time, thus reducing the cost per ton per mile from one-quarter to three-quarters of what it cost him over the poor road. In the following table there is given, approximately, the cost of transporting a load of one ton by horse and wagon a distance of one mile over level roads, with different kinds of surfacing. It will illustrate the great saving in public road transportation if improved roads are constructed.

TABLE No. I

COST OF TRANSPORTATION BY HORSES AND WAGONS, HAULING ONE TON A DISTANCE OF ONE MILE ON DIFFERENT ROAD-COVERINGS

	Cents
On iron rails	1.28
On asphalt	2.70
On stone paving, dry, and in good order.....	5.33
On stone paving, ordinary condition.....	12.00
On stone paving, covered with mud.....	21.30
On broken stone road, dry, and in good order	8.00
On sand-clay road, dry, and in good order	8.00
On broken stone road, moist and in good order	10.30
On broken stone road, ordinary condition	11.90
On broken stone covered with mud	14.30
On broken stone road with ruts and mud	26.00
On earth, dry and hard	18.00
On earth, with ruts and mud	39.00
On gravel, loose	51.60
On gravel, compacted	12.80
On plank, good condition	8.80
On sand, wet	32.60
On sand, dry	64.00

The figures in the above table of course refer to level roads, but, unfortunately, we cannot in the South make all our roads level, as the topography varies from sea level to over 6,000 feet. It is therefore necessary that most of our roads have some grade in them. In our good roads construction, however, we are advocating the lowest grades possible. At the present time, the many steep hills throughout the Piedmont and mountain sections of the South are a very serious drawback to travel and are a very heavy item of expense in the transportation of farm produce and other products. This fact becomes very apparent when we stop to remember that the weight of a load which a team can haul from country to market is limited, not to what it can haul over the good part of the road, but to what it is able to haul up a certain hill over which the road passes. While a steep grade will often shorten the distance between two points, yet inasmuch as the load that a horse can pull decreases very rapidly with the increase in grade, it is by far more economical to increase the distance and decrease the grade. In the following table are given the loads a horse can pull over different grades, considering as a standard that a horse can pull 1,000 pounds on a level road:

TABLE No. 2

LOAD A HORSE CAN PULL OVER DIFFERENT GRADES¹

On a rise of		Load in pounds
1 foot in 100 equals	1 per cent grade	900
1 foot in 50 equals	2 per cent grade	810
1 foot in 40 equals	2½ per cent grade	720
1 foot in 30 equals	3⅓ per cent grade	640
1 foot in 25 equals	4 per cent grade	540
1 foot in 20 equals	5 per cent grade	400
1 foot in 10 equals	10 per cent grade	250

As is well known, in loading a wagon it is loaded with the weight that the team can pull over the rough, steep places, and this means very often that, although the greater part of the road is well graded and a load of 1,000 pounds or more per horse can be pulled, the team is not able to pull more than 500 pounds per horse on account of the steep grades. It has been demonstrated that for a short distance a horse can double his exertions and thus pull twice as much; therefore, if we will keep our grades to not more than four and one-third per cent, that is, a little over four feet in a hundred, we would be able to haul a maximum load, unless such grade were too long. It will also be found that the four and one-third per cent grade is the steepest that a road can have without making it necessary to construct water-breaks or "thank-you-ma'ams" across the road. For these reasons we are advocating in the South that the maximum grade be four and one-third per cent. In certain sections of the mountain regions of the South it may be necessary, at first, to increase this grade; but we are urging upon all the counties that the route be surveyed with a maximum grade of four and one-third per cent, and that the steep grade be used only temporarily, as we are confident that the low grade will be found the cheaper in the end.

In the following southern states, Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas and Virginia there are approximately 502,050 miles of public roads, and there is given in the following table² the mileage by states, together with the miles of public road per square mile of area, and the population per mile of road.

¹From U. S. Dept. of Agr. Farmers' Bulletin No. 136, p. 6.

²Manufacturers' Record, Vol. LIV, No. 26, p. 124, 1909 (Pratt).

TABLE No. 3

State	Population	Area in Square Miles	MILES OF PUBLIC ROADS		
			Total Mileage	Miles of Road per Square Miles of Area	Population per Mile of Road
Alabama	2,250,000	51,998	50,089	0.97	44
Florida	650,000	58,666	17,374	0.34	36
Georgia	2,600,000	59,265	57,203	0.96	45
Louisiana	1,700,000	48,506	24,897	0.54	68
Mississippi	1,750,000	46,865	38,698	0.83	45
North Carolina ..	2,100,000	52,426	49,763	0.95	42
South Carolina ..	1,475,000	30,089	41,830	1.30	35
Tennessee	2,220,000	42,022	48,982	1.17	45
Texas	3,600,000	265,896	121,409	0.46	29
Virginia	2,045,000	42,627	51,812	1.29	39

The number of miles of improved road in these southern states is a very small percentage of the total mileage, but the number of miles of improved roads is increasing very rapidly each year. The total amount of improved roads in these states is approximately 17,690 miles, including macadam, sand-clay, burnt clay and gravel.

There is given in the following table the number of miles of each type of improved road that has been constructed:

TABLE No. 4.

NUMBER OF MILES OF IMPROVED ROAD IN THE SOUTH³

State	Surfaced with Stone	Surfaced with Gravel	Surfaced with Sand, Clay and other Material	Total Mileage of Im- proved Roads	Total Miles of Road
Alabama	425	1,400	75	1,900	50,089
Florida	390	20	600	1,010	17,374
Georgia	500	750	650	1,900	57,203
Louisiana	50	20	70	24,897
Mississippi	10	125	50	185	38,698
North Carolina ..	400	490	475	1,365	49,763
South Carolina ..	100	200	1,700	2,000	41,830
Tennessee	1,800	2,575	4,375	48,982
Texas	1,950	190	55	2,195	121,409
Virginia	800	750	150	1,700	51,812
Total	6,375	6,550	3,775	17,700	502,057

As stated above there are five types of roads being constructed in the South, namely, macadam, sand-clay, burnt clay, gravel and earth roads, the first four representing permanently improved roads.

³Mfrs. Record, Vol. LIV, No. 26, p. 125, 1909 (Pratt).

The macadam road when surfaced is perhaps the best of all improved roads of these four types, provided that bituminous material is mixed with the last three inches of stone to act as a binder to prevent dust, and to relieve wear and tear on macadam made by the tires of wagon wheels and the suction of the tire of the automobile. It is the most expensive of all the roads to build in the South, and there are sections in which there will be little or no macadam road built for many years. We do advocate, however, that in the immediate vicinity of the larger towns the macadam shall be built and where the counties can afford it, a bituminous macadam road should be built throughout the country. On account, however, of the excessive cost of macadam in many portions of the southern states resource has had to be made to another type of road known as the sand-clay road, which when properly constructed has given splendid satisfaction.

This road is supposedly simply a mixture of two parts clay and one part sand, yet considerable skill is required in the mixing of these if the best results are to be obtained. The first southern state to take up the construction of sand-clay roads was South Carolina. Richland County was the pioneer to make these roads by the mixture of sand and clay, and there are now in this county over 250 miles of sand-clay roads, and in the state over 1,700 miles. Lack of material suitable for macadam was the reason this county took up sand-clay roads, but they have proved so satisfactory that not only are these roads being constructed throughout the Coastal Plain Region of many of the southern states, but we are also building them in the Piedmont and even in the mountain sections. As will be seen from Table No. 1, the cost of hauling a ton per mile over a first-class sand-clay road is as low as over the macadam; *i. e.*, eight cents per ton.

Mississippi perhaps contains as little good road material as any of the southern states, and for its macadam work it has had to pay as high as \$9,000 per mile. A new type of road known as the burnt clay road, which consists of surfacing the road with lumps of clay that have been subjected to intense heat and partially burned or baked has been tried. This road is good but not equal to the sand-clay.

Gravel roads are being constructed in a great many portions of the Piedmont and mountain sections of the southern states,

and wherever constructed, if properly drained and graded, make satisfactory roads, although the cost of hauling over them is considerably more than over the first-class macadam.

As shown in Table No. 4 only 17,700 miles of public road out of a total of 502,057, the total mileage of the southern states, have been improved; thus it will be seen that the earth road will represent for many years to come the principal road in the South. The earth roads in every state are capable of being very greatly improved, principally by relocation and by drainage. With the exception of those portions of the South where the earth road is subjected to severe freezes and thaws, this type of road can be kept in good condition throughout the year if properly drained and graded. In order to obtain the best results from the dirt road, it must be kept a dirt road; that is, the surface of such a road should be freed from all rocks and vegetable matter, and crowned so that the center of the road will have a gradual fall to the side ditches of about one to twenty. Any hole that develops in the road should be filled with dirt of the same character as the surface of the road, and in no case should these holes be filled with rock or brush, for to keep the road in the best condition all portions of the surface must be of the same material. The dirt road is also much easier to maintain if, in its location and construction, the sun is permitted to strike it as much as possible. Shade is good for macadam but harmful for the dirt road, inasmuch as it is necessary that the road should dry out as quickly as possible after a rain.

By means of lectures and addresses in the different counties a strong sentiment is being created among the people of the South not only for improved roads, but also for a better class of dirt road, and the results of these lectures can be seen as one travels over the public roads of the South in the better condition of the dirt road in its grade, alignment, width, and general construction. It might be well to state here that all over the South we are advocating a wider road than has been formerly constructed. We wish the roads to average, if possible, thirty feet, so that teams and automobiles can readily pass each other without going into the ditch.

Although in many sections of the South the only method of road construction is by levying a labor tax which requires every able-bodied male resident of a county to work upon the public roads in

his respective township for a certain number of days per annum, yet nearly every section of the South is beginning to consider a direct tax for good roads work. Very few of them have passed any state law requiring a direct tax on \$100 worth of property for use in road and bridge construction, yet nearly every southern state has passed laws permitting the counties to make a direct tax for road construction. There has been a question in many of the states whether a high tax to raise revenue for road construction or a bond issue is the most advisable. I believe that most of the states now consider that bond issues are the best means for raising revenue for improved road construction, and during the past year they have voted or considered bond issues aggregating \$16,026,000. There is given in the following Table No. 5, the amount of bond-issues considered by the different states in 1909.⁴

TABLE No. 5

BOND ISSUES CONSIDERED BY DIFFERENT SOUTHERN STATES IN 1909

Texas	\$5,000,000
Tennessee	3,022,000
Georgia	2,110,000
North Carolina	1,640,000
Florida	1,600,000
Virginia	1,196,000
Alabama	850,000
Mississippi	310,000
Louisiana	298,000
Total	\$16,026,000

These bond issues were not considered directly by the states, but by different counties and townships within the states, and illustrate perhaps better than anything else the interest that the southern states are taking in good roads work.

State aid is also being seriously considered by a number of the southern states, Virginia being the first to take up this kind of work. A highway commission has been created in Virginia, and the Legislature has appropriated \$250,000 for improved road work in the state.

In North Carolina a small appropriation (\$5,000) was made

⁴Address by G. Grosvenor Dawe before Southern Appalachian Good Roads Convention, Asheville, October 7, 1909.

to the Highway Division of the North Carolina Geological and Economic Survey for carrying on the good road campaign in the state. Although the amount is small, the Survey is able to give engineering assistance to counties in location and construction of improved roads, and is able to do considerable work along educational lines in many of the counties.

A similar form of state aid is being considered in Georgia, South Carolina, and Tennessee, and I believe that such aid is a very material assistance in arousing the counties and townships to the need of good roads. In North Carolina it has done a great deal in assisting these counties to pass bonds for good road work.

The work of the good roads associations in the different states has very greatly advanced the good roads movement, there being state good roads associations or clubs in Virginia, North Carolina, South Carolina, Georgia, Alabama and Tennessee. We are organizing county and township associations which work in co-operation with the state association, and thus we are able to carry into every section of the state information regarding the value of good roads and how to obtain them. The latest association is the Southern Appalachian Good Roads Association, whose operations are carried on in the five southern states, Virginia, North Carolina, South Carolina, Georgia and Tennessee. By means of publications, lectures and actual demonstration work in improved road construction, this association hopes to be able to advance still more rapidly the cause of good road construction in the southern states.